

Textbook Notes 3.1 4 3.2

12/1

great work!

3.1 Properties of matter

VOCAB

Substances

- a substance is matter that has a uniform and unchanging chemical composition
- if it has changing or differing chemical composition, it is NOT a substance

- Substance
- physical property
- extensive property
- intensive property
- chemical property

3.1 Physical Properties

- a physical property is a characteristic that can be observed or measured without changing the sample's composition
- describe pure substances ~ consistent & unchanging physical properties.
- Sodium Chloride = solid white crystals @ room temp same taste
- Density, color, odor, taste, hardness, melting point, boiling point

table 3.1

Physical Properties of Common Substances

Substance	Color	State at 25°C	Melting Point (°C)	Boiling Point (°C)	Density (g/cm ³)
O ₂ Oxygen	colorless	gas	-218	-183	0.0014
Mercury	silver	liquid	-39	357	13.5
H ₂ O Water	colorless	liquid	0	100	1.00
Sucrose	white	solid	185	decomposes	1.59
Sodium Chloride	white	solid	801	1413	2.17

Extensive and intensive properties

- Extensive property ~ dependent on amount of substance present
- Intensive property ~ independent of amount of substance present
- substance often identified by intensive properties. (density to tell real from fake gold, etc)

Chemical properties of Matter

- Chemical property ~ ability of a substance to combine with or change into 1+ other substances (even if doesn't change)
- ex: iron → rust when iron + air is chemical property of iron
- iron + oxygen = rust

Observing Properties of Matter

- every substance has unique set of physical & chemical properties

Table 3-2

Properties of Copper

	Physical	Chemical
color →	• reddish brown, shiny	• Forms green copper carbonate compound when in contact with moist air
feel/texture →	• easily shaped into sheets (malleable) and drawn into wires (ductile)	• Forms new substances when combined with nitric acid & sulfuric acid
Strength →	• good conductor of heat & electricity • density = 8.92 g/cm^3 • melting point = 1085°C • boiling point = 2570°C	• Forms a deep blue solution when in contact with ammonia

- Chemical & Physical properties depend on temperature & pressure

States of Matter : Solid, liquid, gas, Plasma

- **Solid** = own definite shape & volume
 - Particles = tightly packed, expands when heated (slightly)
 - incompressible** : can't be pressed into smaller volume
- **Liquid** = flows, constant volume, takes container's shape
 - Particles not rigidly held in place, less close packed
 - also incompressible, also expand when heated
- **gas** = flows to conform to shape of container, (fills it)
 - Particles very far apart
 - easily compressed
 - gas ~ naturally gas @ room temp
 - (vapor is gas of a solid or liquid @ room temp)

QUESTIONS

1. a substance has an unchanging chemical composition that is uniform, it also has a unique set of both physical & chemical properties.
2. a. chemical
b. physical
c. physical
d. chemical
e. physical

Textbook Notes 3.2 (11, 12, 13)

Changes in Matter

Vocab

Physical Changes

- altering substance without changing composition
- Change state = physical change
 - ↳ Physical & Phase change
- temp & pressure @ which substance phase changes
- physical properties

- Physical change
- Chemical change
- law of conservation of mass

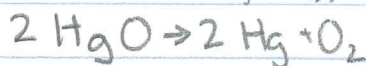
Chemical Changes

- Process that involves substances changing = chemical changes
 - ↳ chemical reaction
- new substance = dif composition = dif properties
- explode, rust, oxidize, corrode, tarnish, ferment, burn, rot
 - ↳ chemical reaction
- dif properties = reaction
 - ↳ reactant substance → dif product substances
- Chemical reaction always produces a change in properties

Conservation of Mass

- law of conservation of mass

Mercury (II) oxide $\xrightarrow{\text{heat}}$ Hg + O₂ ↳ mass neither created / destroyed during chemical reaction (conserved)



216 g = 200g + 16g

(Mass reactants = Mass products)

QUESTIONS

- 11.
- dif properties
 - dif composition
 - turn into dif substances

12. a. $22.99 \text{ g} + 35.45 \text{ g} = 58.44 \text{ g}$

b. $12.2 \text{ g} + X = 78.9 \text{ g}$
 $-12.2 \text{ g} \quad -12.2 \text{ g}$
 $X = 66.7$

$12.2 \text{ g} + 66.7 \text{ g} = 78.9 \text{ g}$

13. Friend is incorrect because appearance is a physical property and can change as a physical change.

$\begin{array}{r} 22.99 \\ + 35.45 \\ \hline 58.44 \end{array}$